

WHAT IS CLAIMED IS:

1. An adaptive cruise control system for an automotive vehicle, comprising:

5 an inter-vehicle distance detecting section that detects a presence of a preceding vehicle which is traveling ahead of the vehicle and detects an inter-vehicle distance between the vehicle and the preceding vehicle;

10 a vehicular velocity detecting section that detects a velocity of at least one of the vehicle and the preceding vehicle;

15 a target inter-vehicle distance setting section that sets a target inter-vehicle distance on the basis of at least one of the velocities of the vehicle and the preceding vehicle;

a vehicular traveling speed controlling section that controls a traveling state of the vehicle on the basis of the detected inter-vehicle distance and the target inter-vehicle distance; and

20 a delay providing section that provides a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance at a time of a detection of one of the velocities of the vehicle and the preceding vehicle
25 which is used to set the target inter-vehicle distance, the target inter-vehicle distance setting section setting the target inter-vehicle distance on the basis of the detected velocity for which the delay is provided by the delay providing section.

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2. An adaptive cruise control system for an automotive vehicle 1, wherein the delay providing section provides a dead time for one of the detected velocities of the vehicle

and preceding vehicle which is used to set the target inter-vehicle distance.

3. An adaptive cruise control system for an automotive vehicle 2, wherein the delay providing section provides a larger dead time for one of the detected velocities of the vehicle and preceding vehicle which is used to set the target inter-vehicle distance as either one of the detected velocities of the vehicle or the preceding vehicle becomes smaller.

4. An adaptive cruise control system for an automotive vehicle as claimed in either claim 2 or claim 3, wherein the delay providing section carries out a low-pass filtering for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance and whose value is equal to or lower than a predetermined value.

5. An adaptive cruise control system for an automotive vehicle as claimed in claim 1, wherein the delay providing section carries out a low-pass filtering for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance.

6. An adaptive cruise control system for an automotive vehicle as claimed in claim 5, wherein a time constant T of the low-pass filter is set to become larger as one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance becomes lower.

7. An adaptive cruise control system for an automotive

vehicle as claimed in either one of claim 5 or claim 6,
 wherein the delay providing section carries out a low-pass
 filtering for one of the detected velocities of the vehicle
 and the preceding vehicle which is used to set the target
 5 inter-vehicle distance and whose value is equal to or lower
 than a predetermined value.

8. An adaptive cruise control system for an automotive
 vehicle as claimed in any one of the preceding claims 1
 10 through 7, wherein the velocity detecting section
 comprises: a vehicular velocity detecting section that
 detects the velocity of the vehicle V_c ; and a preceding
 vehicle velocity detecting section that detects the
 velocity of the preceding vehicle V_F on the basis of a relative
 15 velocity V_r of the vehicle to the preceding vehicle and
 the velocity of the vehicle.

9. An adaptive cruise control system for an automotive
 vehicle as claimed in claim 4, wherein the delay providing
 20 section provides a largest dead time for one of the
 velocities of the vehicle and the preceding vehicle which
 is used to set the target inter-vehicle distance when either
 one of the velocity of the host vehicle or the preceding
 vehicle is equal to or lower than a first predetermined
 25 velocity value, provides a second largest dead time for
 one of the velocities of the vehicle and the preceding vehicle
 which is used to set the target inter-vehicle distance when
 either one of the velocity of the vehicle or the preceding
 vehicle is higher than the first predetermined velocity
 30 value but is equal to or lower than a second predetermined
 velocity value, provides a third largest dead time for one
 of the velocities of the vehicle and the preceding vehicle
 which is used to set the target inter-vehicle distance when

either one of the velocity of the host vehicle or the preceding vehicle is higher than the second predetermined velocity value but is equal to or lower than a third predetermined velocity value, provides a fourth largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the host vehicle or the preceding vehicle is higher than the third predetermined velocity value but is equal to or lower than a fourth predetermined velocity value, and provides a fifth largest dead time for one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance when either one of the velocity of the host vehicle or the preceding vehicle is higher than the fourth predetermined velocity value but is equal to or lower than a fifth predetermined velocity value.

10. An adaptive cruise control system for an automotive vehicle as claimed in claim 9, wherein the delay providing section provides a fifth control number of times previously detected velocity of the preceding vehicle V_{F5} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is equal to or lower than the first predetermined velocity value, provides a fourth control number of times previously detected velocity of the preceding vehicle V_{F4} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the first predetermined velocity value but is equal to or lower than the second predetermined velocity value,

provides a third control number of times previously detected velocity of the preceding vehicle V_{F3} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the second predetermined velocity value but is equal to or lower than the third predetermined velocity value, provides a second control number of times previously detected velocity of the preceding vehicle V_{F2} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the presently detected velocity of the preceding vehicle V_F is higher than the third predetermined velocity value but is equal to or lower than the fourth predetermined velocity value, and provides a once control number of time previously detected preceding vehicle V_{F1} for the detected velocity of the preceding vehicle V_{FF} used to set the target inter-vehicle distance when the detected velocity of the preceding vehicle is higher than the fourth predetermined velocity value but is equal to or lower than the fifth predetermined velocity value.

11. An adaptive cruise control system for an automotive vehicle as claimed in claim 10, wherein the target inter-vehicle distance setting section sets the target inter-vehicle distance D^* as follows: $D^* = \alpha \cdot V_{FF} + \beta$, wherein V_{FF} denotes the detected velocity of the preceding vehicle for which the delay is processed, α denotes a predetermined inter-vehicle time duration, and β denotes a predetermined distance at a time of a stop of the vehicle to reach to a position of the preceding vehicle and wherein the adaptive cruise control system further comprises: a difference value calculating section that calculates a difference of the set target inter-vehicle distance D^* from the detected

inter-vehicle distance D as follows: $\Delta D = D - D^*$; an
inter-vehicle distance priority target
acceleration/deceleration G_p as follows: $G_p = F_1 \cdot \Delta D$, wherein
 F_1 denotes a predetermined feedback gain; a target vehicular
5 velocity calculating section that calculates a target
velocity of the vehicle V_c^* on the basis of a set vehicle
speed V_s ; a vehicular velocity priority target
acceleration/deceleration calculating section that
calculates a vehicular velocity priority target
10 acceleration/deceleration G_v on the basis of a difference
between the target velocity of the vehicle V_c^* and the
detected velocity of the vehicle V_c ; a target
acceleration/deceleration calculating section that
calculates a target acceleration/deceleration G^* on the
15 basis of the target inter-vehicle distance priority
acceleration/deceleration G_p , the vehicular velocity
priority acceleration/deceleration G_v , and whether the
inter-vehicle distance detecting section detects the
presence of the preceding vehicle; and an acceleration
20 controlling section that performs an acceleration control
of the vehicle on the basis of the target
acceleration/deceleration G^* .

12. An adaptive cruise control system for an automotive
25 vehicle as claimed in claim 7, wherein the time constant
 T of the low-pass filter is set to give a maximum value
 T_0 for the detected velocity of the vehicle used to set
the target inter-vehicle distance when the detected
velocity of the vehicle V_c is zero, is set to become smaller
30 as the detected velocity of the vehicle V_c is increased,
and is set to give zero when the detected velocity of the
vehicle V_c becomes equal to the predetermined value.

13. An adaptive cruise control method for an automotive vehicle, comprising:

detecting a presence of a preceding vehicle which is traveling ahead of the vehicle;

5 detecting an inter-vehicle distance between the vehicle and the preceding vehicle;

detecting a velocity of at least one of the vehicle and the preceding vehicle;

controlling a traveling state of the vehicle on
10 the basis of the detected inter-vehicle distance and a target inter-vehicle distance;

providing a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance at a time of a detection
15 of one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance; and

setting the target inter-vehicle distance on the basis of the detected velocity of one of the vehicle and
20 the preceding vehicle for which the delay is provided.

14. An adaptive cruise control system for an automotive vehicle, comprising:

inter-vehicle distance detecting means for
25 detecting a presence of a preceding vehicle which is traveling ahead of the vehicle and detecting an inter-vehicle distance between the vehicle and the preceding vehicle;

vehicular velocity detecting means for detecting
30 a velocity of at least one of the vehicle and the preceding vehicle;

target inter-vehicle distance setting means for setting a target inter-vehicle distance on the basis of

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at least one of the velocities of the vehicle and the preceding vehicle;

vehicular traveling speed controlling means for controlling a traveling state of the vehicle on the basis
5 of the detected inter-vehicle distance and the target inter-vehicle distance; and

delay providing means for providing a delay for one of the detected velocities of the vehicle and the preceding vehicle which is used to set the target
10 inter-vehicle distance at a time of a detection of one of the velocities of the vehicle and the preceding vehicle which is used to set the target inter-vehicle distance, the target inter-vehicle distance setting means setting the target inter-vehicle distance on the basis of the
15 detected velocity for which the delay is provided by the delay providing means.

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